of the agricultural section (chap. v.) is the proposal to base the legal classification of land upon indicator communities. The bearing of the study of climatic cycles on agricultural practice is dealt with in the light of facts already for the most part summarised in "Plant Succession." The large amount of space devoted to grazing-indicators (chap. vi., 66 pages) is accounted for partly by the very full discussion of over-grazing, in the detection of which condition indicator-species appear to be specially helpful, and partly by a digression on the general principles of range [ranch] improvement. As regards the forestry section (chap. vii.), the very scant attention paid to afforestation is disappointing to the European reader, though comprehensible in view of the relatively large area of natural forest growth still preserved intact in North America.

In order properly to appreciate Dr. Clements's arguments, it is above all necessary to understand his point of view, which is that of a thorough-going adaptationist who regards every feature in the behaviour or structure of an organism as a response to environment. His utmost concession to the influence of heredity is the admission that "structure also possesses a well-known inertia, as the result of which it may register the impact of factors but partially or slightly." Probably few biologists will be satisfied with so meagre an allowance for the factor of inherited constitution. Further, for Dr. Clements, "ecology is the central and vital part of botany," and other lines of botanical research are, or ought to be, subordinated thereto. One need not, therefore, be surprised to meet with sweeping proposals for the radical reform of taxonomy, involving the institution of a trinomial nomenclature [!] and the virtual abolition of the use of herbarium type-specimens. Unless we are prepared to jettison the taxonomic work of the past centuries in its entirety, it is to be feared that a hasty acceptance of such revolutionary suggestions would increase rather than diminish the difficulties that already beset the taxonomist and all who depend upon him. Doubtless "the practical man is [or would like to be] concerned primarily with real species rather than with the many varieties and forms into which some of them fall"; but the problem of what are "real species" remains to be solved, and surely this desirable end is more likely to be attained through a healthy co-operation among workers in the various branches of biology than by a *tour de force* in any one of them.

Apart from such debatable matter, "Plant Indicators" is a record of a large quantity of solid observation and experiment, and a stimulating book with a wider appeal than that of the average ecological memoir. Judgment as to the practical value of the indicator method must be suspended until it has undergone the test of extensive application under varied conditions and on an economic footing.

Dr. Clements properly lays stress on the special value of ecological research in new or partly settled regions. Oddly enough, no mention is made of those tropical countries which in every respect offer the most promising field to the ecologist, and to which American botanists have unrivalled facility of access.

M. D.

The Food Problem of the United States.

The Nation's Food: A Statistical Study of a Physiological and Social Problem. By Prof. Raymond Pearl. Pp. 274. (Philadelphia and London: W. B. Saunders Co., 1920.) Price 16*s*. net.

ONE result of the Great War has been to bring into unusual prominence the problem of the world's food supply. Each civilised nation contains two great divisions, which in many ways are somewhat antagonistic, dependent respectively on food production and on industrial work. The problem differs in urgency for the two groups: for the food producer, living in the country, it is one of greater or smaller profits, but not of daily bread, of which he is certain; for the industrial town-dweller the problem is more serious, because the intricate social machine is easily thrown out of gear by a few disaffected spirits, and food is forthcoming only so long as the machine turns out sufficient goods to induce the production of more food than the countryman needs for his own consumption.

Prof. Raymond Pearl has given in this book a statistical study of the food problem of the United States, and with his usual thoroughness and breadth of view he has included in his inquiry so many ramifications that his investigation covers Europe also. It thus possesses extraordinary interest at the present time. His tables contain a wealth of material of which only a few indications can be given here. The contribution made by the United States to the food supply of the Allies during the war was remarkable. The pre-war average export of wheat and flour was 122·7 million bushels, of which 43·3 million went to the Western Allies; during the war, but before America's entry, it rose to 262·9 million bushels, of which 151·2 million went to the Allies; even in the first year of the war the Allies still received

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114·8 million bushels. This astonishing change is a remarkable achievement for which the Allies may well be grateful and of which America may justly be proud. The total production of food naturally did not increase to the same extent. The data are :—

Total Food Production in the United States: Metric Tons, Millions.

	Total food	Protein	Fat	Carbohydrates	Total Calories, million millions
Average for 7 years, 1911–18	90·2	4 1	5·7	16·3	137·2
,, ,, 3 pre-war years	85·6	3 8	15·5	15·3	129·3
,, ,, war period ...	93·7	4·2	5·9	17·1	143·0

Animals contributed 58 per cent. of the total food, 50 per cent. of the protein, and 83 per cent. of the fat.

The table further shows what a vast amount of food has to be grown in order to produce a sufficiency of nutrients; only 29 per cent. of the total tonnage of human food is net nutrients; the remainder is water, ash, and inedible refuse.

Comparing the annual increases in the production of food with the growth of the population, Prof. Pearl arrives at the comforting conclusion that the food supplies of the United States are increasing more rapidly than the population, so that there is "as yet no occasion for worry along Malthusian lines in this country so far as subsistence is concerned."

Study of the details of Prof. Pearl's tables brings out a number of points of importance to administrators. The very small part played and playable—by the so-called "home garden" movement is shown by the fact that the *total* vegetable production of farm and garden amounts to only 2 per cent. of the total Calorie production in human food, and of this 2 per cent. a large proportion is contributed by commercial concerns. Similarly, poultry contributes less than 2 per cent. of the Calories. Cows, pigs, and wheat are the great reservoirs, contributing together 62 per cent. of all the protein and carbohydrate used as human food, 69 per cent. of all the fat, and 65 per cent. of all the Calories. Obviously, if there is to be an increase in human food we must concentrate on these (and in England on the sheep as well), and not lose ourselves in less important items, although, on the other hand, we must not fail to develop even a 1 per cent. item.

The distribution of this enormous production is elaborately dealt with. The high-water mark of exports was reached in the year 1914–15; thereafter they fell, and in 1917–18 were down almost to pre-war level; but, of course, the exported food was all going to the Allies instead of being distributed over the world. The 1914–15 result is explained by supposing that all reserves were then cleared out—a process obviously possible once only. In spite of the high exports, more food remained in the United States than in the pre-war period, which may be connected with the larger and more prosperous domestic population.

Finally, a table is given showing the average daily consumption per "adult man." For convenience the British data are also given. The figures are as follows :—

	United States		United Kingdom	Physiologica minimum
	Corrected for waste Grams per day	Not corrected for waste Grams per day	Not corrected for waste Grams per day	Grams per day
Protein ...	114	120	113	100
Fat	127	169	130	100
Carbohydrate	433	541	571	500
Calories ...	3424	4288	4009	3400

The United Kingdom figures are taken from the Royal Society's Report (Cd. 8421), and show that we eat less than our cousins across the water, unless, indeed, we waste less.

E. J. RUSSELL.

Theory of Electric Cables.

The Theory of Electric Cables and Networks. By Dr. Alexander Russell. Second edition. Pp. x+348. (London: Constable and Co., Ltd., 1920.) Price 24*s.* net.

DR. RUSSELL'S well-known book on the theory of electric cables and networks is one which should be increasingly studied as the complex networks, which are now required in connection with large power stations, are constructed. The book is already well known to electrical engineers. It lays down those fundamental principles on which all designs of cable networks must be built up. The kilowatt capacity of central stations for generating electrical energy is now three times as large as it was when the first edition of Dr. Russell's book was published, and the importance of economical design in cables and networks is much more clearly recognised than it was twelve years ago.

The chief difference between the first edition and the second is the introduction of new chapters on alternating current theory and systems of supply, and in the inclusion of numerical examples which will make the book more useful for beginners. Some further extensions of Kelvin's law have been made, and an account is given of recent developments in cable construction. The scope of the work is so well known that it is not necessary to review it in detail. It deals with the properties of conductors and of insulating materials, methods of testing them, and the economy of the

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